US 20070256259A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2007/0256259 A1**

Hafliger et al. (43) **Pub. Date: Nov. 8, 2007**

(54) **PERSONAL HYGIENE ARTICLE WITH VIBRATING PART AND METHOD**

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(21) Appl. No.: **11/826,292**

(22) Filed: **Jul. 13, 2007**

Related U.S. Application Data

(60) Continuation of application No. 11/245,027, filed on Oct. 7, 2005, now Pat. No. 7,261,851, which is a division of application No. 10/913,485, filed on Aug. 9, 2004, now Pat. No. 7,003,839, and which is a division of application No. 10/093,699, filed on Mar. 11, 2002, now Pat. No. 6,802,097, and which is a continuation of application No. PCT/CH00/00563, filed on Oct. 18, 2000.

(30) **Foreign Application Priority Data**

Oct. 19, 1999 (DE)..... 199 50 204.8
Nov. 3, 1999 (DE)..... 299 19 053.6

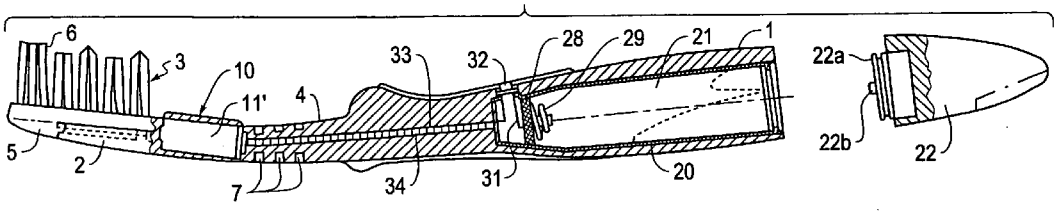
Publication Classification

(51) **Int. Cl.**
A46B 13/02 (2006.01)
B29C 45/00 (2006.01)
B29C 45/14 (2006.01)

(52) **U.S. Cl.** **15/22.2**; 15/22.1; 264/241; 264/272.11

(57) **ABSTRACT**

An interdental treatment device, such as a toothbrush, includes a handle configured to accommodate an electric power source, a head carrying an interdental treatment tool, and a neck between the handle and the head. The head or neck includes a mechanical motorized vibratory device, including a drive which causes the head to vibrate. Electrical connections are operably connected to the mechanical vibratory device and the electric power source to power the mechanical vibratory device via the electrical connections. At least parts of the electrical connections are formed by tracks of an electrically conductive plastic material. In various embodiments, a vibration-damping structure dampens vibration transmission from the head to the handle.



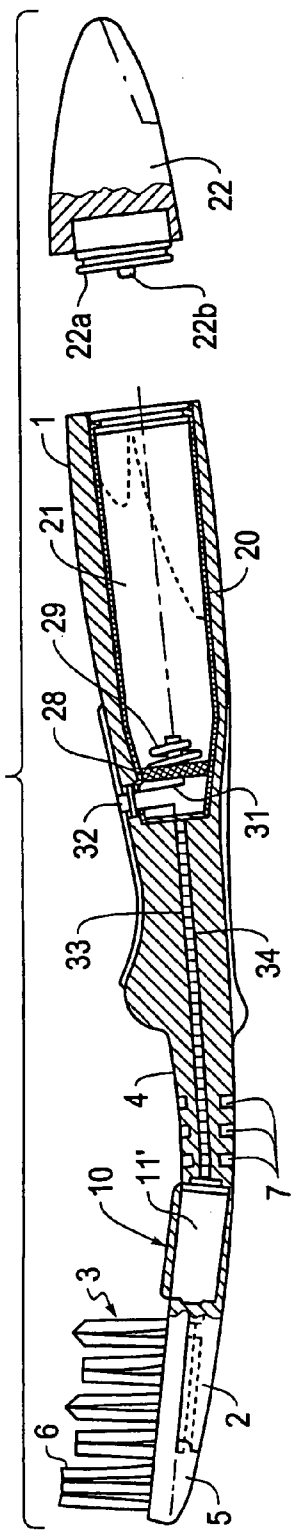


Fig. 1

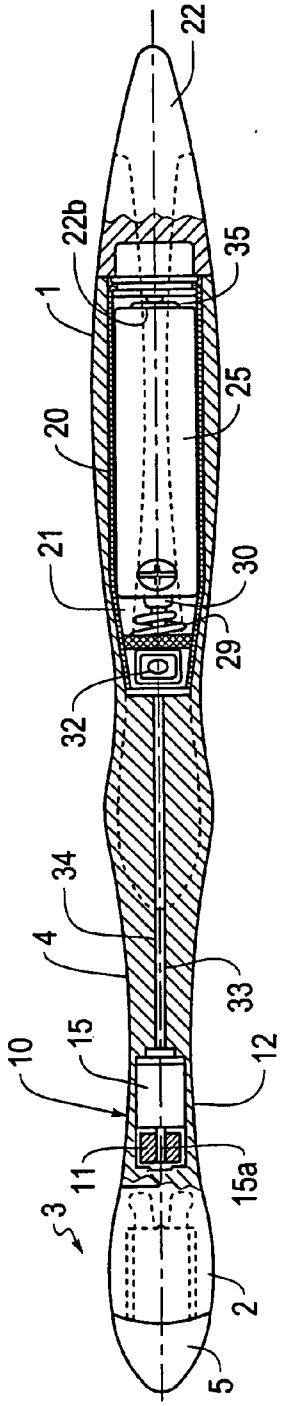


Fig. 2

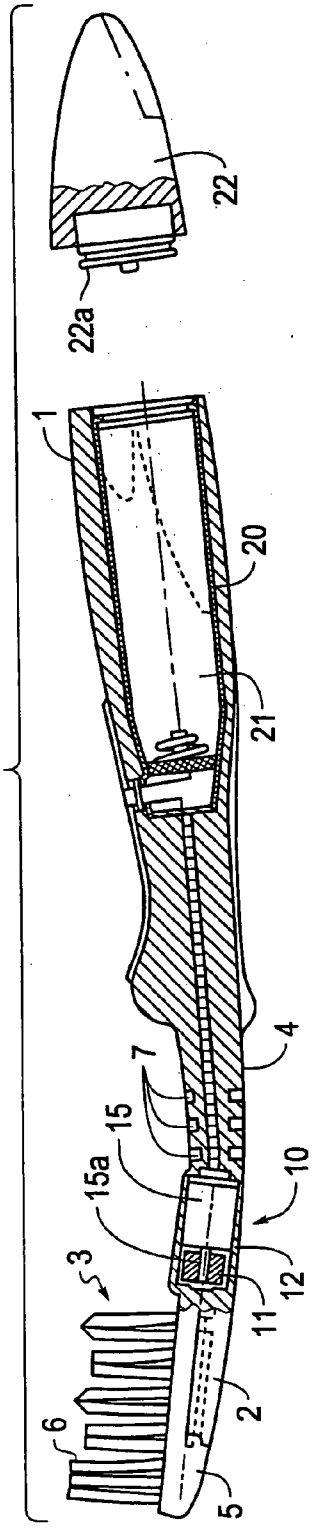


Fig. 3

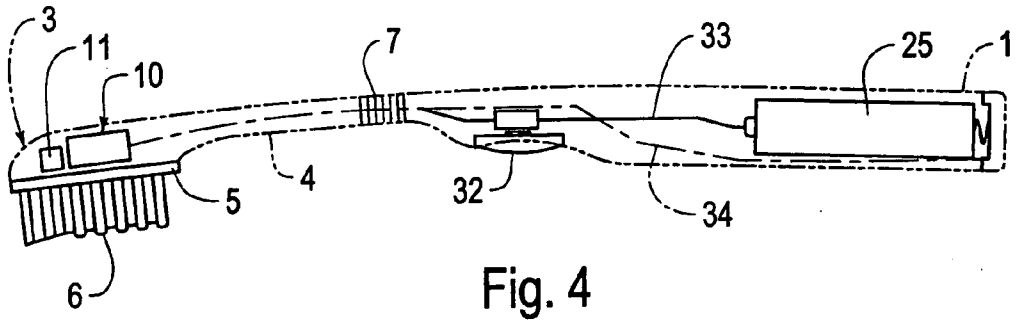


Fig. 4

Fig. 5a

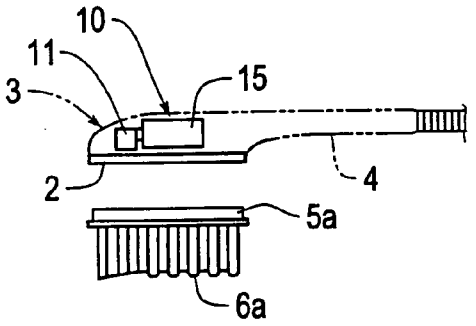


Fig. 5b

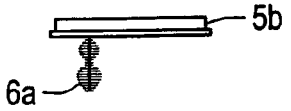
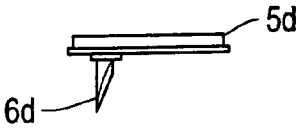


Fig. 5c

Fig. 5d



PERSONAL HYGIENE ARTICLE WITH VIBRATING PART AND METHOD

[0001] This application is a Continuation of application Ser. No. 11/245,027 filed Oct. 7, 2005, which is a Divisional of application Ser. No. 10/913,485 filed Aug. 9, 2004, which is a Divisional of application Ser. No. 10/093,699 filed Mar. 11, 2002, which is a Continuation of PCT/CH00/00563 filed Oct. 18, 2000. The disclosure of the prior applications is hereby incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of Invention

[0003] The invention relates to an interdental treatment device that includes an electrically powered vibrating head.

[0004] 2. Description of Related Art

[0005] For teeth-cleaning purposes nowadays use is made either of conventional manual toothbrushes or of electric toothbrushes, in the case of which a movable brush head can be motor-driven from the handle. Electric toothbrushes usually achieve a more intensive cleaning action than the manual toothbrushes, but they have the disadvantage that they are relatively bulky and expensive and may damage the gums and subject the tooth enamel to pronounced abrasion.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to provide a cost-effective vibrating toothbrush which corresponds, in size, approximately to the conventional manual toothbrushes and nevertheless allows a better cleaning action than the latter.

[0007] This object is achieved according to the invention by a toothbrush including a vibrating head part, a mechanical vibratory device in at least one of the head and a neck, and a power supply, preferably in the handle.

[0008] Since a mechanical vibratory device which causes the head part to vibrate is accommodated in a front head part of the toothbrush, or in a neck-part region adjacent to the head part, the neck part connecting the head part to the handle, and is operatively connected to a power source, preferably accommodated in the handle, via electrical connections running in the neck part, vibration-damping means preferably being provided in order to prevent vibration transmission to the handle, this achieves the situation where the vibrations which effect the improved cleaning action are produced predominantly in the head part and can only be felt to a slight extent in the handle, as a result of which comfortable handling of the toothbrush is achieved. A further advantage of the toothbrush according to the invention is that there is no need for any mechanical drive means to be led through the flexible neck part to the vibratory device. It is merely the electrical connections, designed as wires, cables or electrically conductive plastic tracks, which run through the neck part.

[0009] Preferred developments of the toothbrush according to the invention form the subject matter of the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention will now be explained in more detail with reference to the drawing, in which, purely schematically:

[0011] FIG. **1** shows a side view, partially in section, of a first exemplary embodiment of a toothbrush according to the invention and of a handle-closure part separated from one another (without a battery);

[0012] FIG. **2** shows a bottom view, partially in section, of a second exemplary embodiment of a toothbrush according to the invention in the assembled state;

[0013] FIG. **3** shows a side view, partially in section, of the toothbrush according to FIG. **2** and the closure part separated from one another (without a battery);

[0014] FIG. **4** shows a side view of a third exemplary embodiment of a toothbrush according to the invention in the assembled state;

[0015] FIG. **5**A shows a front part of the toothbrush according to FIG. **4** with different embodiments of exchangeable interdental treatment heads; and

[0016] FIGS. **5**B-D show different embodiments of exchangeable interdental treatment heads.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] Both the toothbrush illustrated in FIG. **1** and that according to FIGS. **2** and **3** each have a handle **1**, a front bristle-carrying head part **3** and a neck part **4**, which connects the head part **3** to the handle **1**. The bristles combined to form clusters of bristles **6** are anchored in a bristle carrier **5** and form a possibly profiled brushing surface with their free ends. In the embodiment illustrated, the bristle carrier **5** with the clusters of bristles **6** is positioned, in a manner which is known per se and thus is not described in any more detail, on a retaining part **2** of the head part **3** such that it can be exchanged.

[0018] The neck part **4** is provided with neck-part zones **7** which are made of an elastically relatively compliant material component and provide for, or additionally increase, the elasticity of the neck part **4**, with the result that, during use of the interdental treatment device, the head part **3** can be forced back resiliently in the case of forces acting in the direction of the brushing surface. If appropriate, the neck-part zones **7** are designed as notches which extend over part of the neck circumference and are filled with elastically compliant material (e.g. with thermoplastic elastomer). Of course, it would also be quite conceivable for the form and number of neck-part zones to be different. It is also conceivable to have a flexible neck zone without using elastic material components, e.g. by providing constrictions or by way of a bellows.

[0019] Integrated in the front head part **3**, or in that region of the neck part **4** which is adjacent to the head part **3**, is a mechanical vibratory device **10**, by means of which vibrations which effect or enhance the teeth-cleaning action may be imparted to the head part **3**. The vibratory device **10** can be connected to an electric power source, accommodated in the handle **1**, via electrical connections running in the neck part **4**, as is described herein below. The already mentioned neck-part zones **7** made of an elastically compliant material act here as means which damp the vibration between the vibrating head part **3** and the handle **1**, with the result that the vibratory action is produced, in particular, in the head part and is only transmitted to the handle **1** to a slight extent.

This means that only slight vibrations can be felt in the handle **1** during the teeth-cleaning operation, and the toothbrush is thus comfortable to handle. Conversely, however, it is also advantageous that the vibration produced is not damped by the handle **1** and can act to full effect in the head part **3**. Instead of the neck-part zones **7** consisting of elastically compliant material, however, other vibration-damping means would also be conceivable; it is not absolutely necessary to use an elastic material. The damping may also be achieved, using a basic material, by the neck part being configured in a

[**0020**] Accommodated in the handle **1** is a sheath or sleeve **20** which extends in the particular form, for example by the presence of a bellows/accordion part, etc. longitudinal direction of said handle and is made of electrically conductive material. Both the handle **1** and the sleeve **20** are open to the rear, this forming a cavity **21** which can be closed from the rear by a closure part **22** and into which it is possible to insert a battery **25**, in the exemplary embodiment illustrated a commercially available, non-rechargeable cylindrical battery, with a defined power (e.g. 1.5 V) as the power source for the vibratory device **10**. It would also be possible, however, for a button cell or for a rechargeable storage battery to be used as the power source.

[**0021**] A spring contact **29** for the positive pole **30** of the battery **25** (see FIG. **2**) is fitted in the sleeve **20**, on a transverse wall **28**, and is connected to the vibratory device **10** via an electric line **31**, a switch **32**, which is installed in the sleeve **20** and can be actuated from the outside of the handle **1**, and an electric line **33** running in the neck part **4**. The electrical connection can be interrupted by means of the switch **32**.

[**0022**] The closure part **22** is provided with a threaded stub **22***a* made of an electrically conductive material and can be screwed into the handle **1** and/or into the sleeve **20** by way of said threaded stub. The threaded stub **22***a* is provided with a contact surface **22***b* which, with the closure part **22** screwed in, comes into abutment against the negative pole **35** of the battery **25** inserted into the sleeve **20**. The negative pole **35** is electrically connected to the vibratory device **10** via the threaded stub **22***a*, the sleeve **20** itself and a line **34**, which connects the sleeve **20** to the vibratory device **10** and runs in the neck part **4**.

[**0023**] Instead of being transmitted via the electrically conductive sleeve **20**, it would also be possible for the power from the negative pole **35** to be transmitted in some other way, for example using wires or an electrically conductive plastic.

[**0024**] In the exemplary embodiment illustrated in FIG. **1**, the vibratory device **10** comprises a vibratory element **11'** which functions preferably in the manner of a vibratory armature, can be electrically connected directly to the power source via the lines **33**, **34** and, with the power source connected, is made to vibrate.

[**0025**] In the case of the toothbrush variants illustrated in FIGS. **2** and **3**, the vibratory device **10** comprises a vibratory element **11** in the form of an eccentric, which produces mechanical vibrations and can be rotated about an axis located in the longitudinal direction of the toothbrush, and also comprises a drive which is arranged directly adjacent and is designed as a micromotor **15**. The vibratory element **11** is connected to the shaft **15***a* of the micromotor **15**, which can be electrically connected to the power source via the lines **33**, **34**. The micromotor **15** and the eccentric may be accommodated as a structural unit in a housing **12**.

[**0026**] Instead of an eccentric which can be driven in rotation, it would also be possible to have a vibratory element **11** which can be driven in a translatory manner.

[**0027**] It would be possible, in the case of the toothbrush according to the invention, to arrange the bristle-carrying head part **3** such that it can be moved in relation to the neck part **4** in order for the latter, in the case of vibrations produced by means of the vibratory device **10**, to be made to move in relation to the rest of the toothbrush.

[**0028**] The electric lines **31**, **33**, **34** could also be realized by electricity-conducting plastic tracks.

[**0029**] The switch **32**, which connects or interrupts the lines **31**, **33**, may also be, for example, a magnetic switch.

[**0030**] The preferred configuration of the switch **32**, however, contains a pulse switch arranged on a printed circuit board as well as further electronic components which store the switching state.

[**0031**] It is also possible, however, for the electrical connection between the battery **25** and the vibratory element **11'** (FIG. **1**) or the drive **15** (FIGS. **2** and **3**) to be produced or interrupted not by the switch **32**, but by the closure part **22**, which can be screwed into the handle **1** and/or into the sleeve **20** or connected to the same in a bayonet-like manner, being turned (i.e. the switch **32** is dispensed with in the case of such a configuration).

[**0032**] Instead of the rear closure part **22** being screwed to the handle **1**, it would, of course, also be possible to have some other type of releasable connection (e.g. plug-in connection, bayonet connection, etc.) and a corresponding configuration of the contact part interacting with the negative pole **35**.

[**0033**] It would also be possible for the closure part **22** to be in a form which is quite different to that illustrated in the drawing. For example, the closure part could be provided with a set-down surface or a foot part and thus serve as an element on which the toothbrush can be set down.

[**0034**] The toothbrush illustrated in FIG. **4** corresponds essentially to that according to FIGS. **2** and **3**; the same parts, once again, have the same designations. According to FIG. **4**, the vibratory device **10** is arranged directly in the front head part **3**. In this exemplary embodiment, the sleeve **20** is dispensed with; the battery **25** is connected directly to the vibratory device **10** via the lines **33**, **34**. It is also the case with this device that use is preferably made of an exchangeable carrier **5** which can be positioned on a retaining part **2** of the head part **3**, e.g. in the manner of a snap-in connection. The capacity for changing the bristle carrier **5** provided with the clusters of bristles **6** is particularly advantageous since the interdental treatment device provided with the vibratory device **10** can be used irrespective of the service life of the bristles, which is usually even shorter than the service life of the battery **25**.

[**0035**] As can be seen from FIG. **5**, it is possible, instead of the bristle carrier **5** or **5***a*, which forms part of a conventional brush head and is provided with respective clusters of

bristles **6** or **6***a*, to position other, optionally different carriers or adapters **5***b* to **5***d* on the retaining part **2**, these being provided with different interdental brushes **6***b*, **6***c* or interdental treatment parts **6***d* for effective cleaning of the spaces between the teeth. The interdental brush **6***b* may be designed, for example, as a helical brush made of coated wire with plastic filaments twisted in. The interdental brush **6***c* comprises bristles which, together, form a cluster tip. The treatment part **6***d* may be designed, for example, as a plastic element which has a tip and may preferably be provided with an abrasive coating for removing plaque and tartar from the spaces between the teeth. Of course, it would also be possible to use any other desired treatment heads.

[**0036**] It is also the case with the variant according to FIGS. **4** and **5** that the bristle carrier **5** could be configured such that a vibration-induced movement in relation to the retaining part **2** were possible.

[**0037**] For the introduction of the vibratory device **10**, the connecting lines **33**, **34** and further electronic components, it is possible for the toothbrush according to the invention, or the housing thereof, to be produced in two parts and for the two parts to be welded in a water-tight manner once the abovementioned parts have been positioned therein.

[**0038**] It is also possible, however, for the toothbrush according to the invention to be produced by injection molding preferably involving two or more components. The abovementioned parts are advantageously positioned as a unit in an injection molding made of a first material component and then encapsulated in the second material component (or in the further material component) by injection molding. It is not necessary here for full encapsulation to take place. Certain parts may be exposed, as a result of which it is possible to achieve an esthetic effect.

[**0039**] It would also be possible, however, for the abovementioned electronic components to be inserted into a ready molded handle **1**.

[**0040**] Since it is not only the vibratory element **11**, **11'** itself but also the drive, i.e. the micromotor **15**, which are arranged in the front head part **3**, or in the directly adjacent front region of the neck part **4**, it is not necessary for any mechanical drive means to be led through the flexible neck part **4** in order to connect the micromotor to the vibratory element **11**. It is only the electric lines **33**, **34** (wires, cables or electrically conductive plastic tracks) which run through the neck part **4**.

[**0041**] According to the invention, use is made of a mechanical vibratory device **10** which has a diameter of less than 15 mm, preferably less than 6 mm, and is less than 35 mm, preferably less than 20 mm, in length. This ensures that the toothbrush may be of ergonomic configuration and is easy to handle. The toothbrush according to the invention may correspond, in size, more or less to the conventional manual toothbrushes, which makes them more straightforward to handle in comparison with the commercially available, considerably larger electric toothbrushes, even though this toothbrush achieves a cleaning action which is comparable with that of the known electric toothbrushes, but is gentler than the latter. Moreover, the toothbrush according to the invention is straightforward and cost-effective to produce.

[**0042**] It is nevertheless also possible for the vibratory device according to the invention to be integrated in conventional electric toothbrushes.

What is claimed is:

1. An electrical toothbrush comprising:

a handle (**1**):

a bristle-carrying head (**3**);

a neck (**4**) between the handle (**1**) and the head (**3**);

a device consuming electrical energy (**10**);

an electrical power source (**25**); and

electrical connections (**31**, **33**, **34**) for connecting the electrical power source (**25**) with the device consuming electrical energy (**10**), at least part of the electrical connections being formed by tracks of an electrically conductive plastic material.

2. The toothbrush as claimed in claim 1, wherein the device consuming an electrical energy (**10**) is located in the head (**3**) or in a region of the neck (**4**) adjacent to the head (**3**) and the electrical power source (**25**) is accommodated in the handle (**1**), the neck (**4**) being provided with electrical connections (**33**, **34**) formed by tracks of an electrically conductive plastic material and extending through the neck.

3. The toothbrush as claimed in claim 1, wherein the device consuming electrical energy (**10**) is located in the head (**3**) or in a region of the neck (**4**) adjacent to the head (**3**) and the electrical power source (**25**) is accommodated in the handle, the handle (**1**) being provided with electrical connections (**31**) formed by tracks of an electrically conductive plastic material.

4. The toothbrush as claimed in claim 2, further comprising a vibration-damping structure in the neck (**4**) for dampening vibration transmission from the head (**3**) to the handle (**1**).

5. The toothbrush as claimed in claim 2, wherein the neck (**4**) includes at least one vibration-damping zone (**7**) comprising an elastically compliant material.

6. The toothbrush as claimed in claim 1 wherein the device consuming electrical energy is a mechanical motorized vibratory device (**10**) located in the head (**3**) or in a region of the neck (**4**) adjacent to the head (**3**), and the mechanical motorized vibratory device (**10**) causes the head (**3**) to vibrate.

7. The toothbrush as claimed in claim 1, further comprising a molded part made from a first material component by injection molding and being provided with electrical connections being formed by tracks of an electrically conductive plastic material, the electrical connections being formed by tracks of an electrically conductive plastic material being at least partly surrounded by a further material component applied by injection molding.

8. The toothbrush as claimed in claim 7, wherein the electrical connections being formed by tracks of an electrically conductive plastic material are at least partly exposed.

9. An electrical toothbrush comprising:

a handle (**1**);

a bristle-carrying head (**3**);

a neck (**4**) between the handle (**1**) and the head (**3**);

a device consuming electrical energy (**10**);

an electrical power source (**25**); and

electrical connections (**31**, **33**, **34**) for connecting the electrical power source (**25**) with the device consuming electrical energy (**10**), at least part of the electrical connections being formed by tracks of an electrically conductive plastic material, the tracks of an electrically conductive plastic material being at least partially surrounded by a further material component applied by injection molding.

10. The toothbrush as claimed in claim 9, wherein the electrical connections being formed by tracks of an electrically conductive plastic material are at least partly exposed.

11. An electrical toothbrush comprising:

a handle (**1**);

a bristle-carrying head (**3**);

a neck (**4**) between the handle (**1**) and the head (**3**);

a device consuming electrical energy (**10**);

an electrical power source (**25**); and

electrical connections (**31**, **33**, **34**) for connecting the electrical power source (**25**) with the device consuming electrical energy (**10**), at least part of the electrical connections being formed by tracks of an electrically conductive plastic material, the toothbrush being produced by injection molding using a first and a second material component, the electrical connections being formed by tracks of an electrically conductive plastic material being arranged at least partially between the first and second material component.

12. A method for producing an electrical toothbrush, which includes a handle (**1**), a bristle-carrying head (**3**), a neck (**4**) between the handle (**1**) and the head (**3**), a device consuming electrical energy (**10**), an electrical power source (**25**), and electrical connections (**31**, **33**, **34**), comprising:

producing the toothbrush by injection molding using a first and a second material component, and

forming at least part of the electrical connections (**32**, **33**, **34**) by tracks of an electrically conductive plastic material.

13. A method for producing an electrical toothbrush, which includes a handle (**1**), a bristle-carrying head (**3**), a neck (**4**) between the handle (**1**) and the head (**3**), a device consuming electrical energy (**10**), an electrical power source (**25**), and electrical connections (**31**, **33**, **34**), comprising:

forming at least part of the electrical connections (**31**, **33**, **34**) by tracks of an electrically conductive plastic material, and

at least partially surrounding the tracks of an electrically conductive plastic material by a further material component applied by the injection molding.

14. A method for producing an electrical toothbrush, which includes a handle (**1**), a bristle-carrying head (**3**), a neck (**4**) between the handle (**1**) and the head (**3**), a device consuming electrical energy (**10**), an electrical power source (**25**), and electrical connections (**31**, **33**, **34**), comprising:

forming at least part of the electrical connections (**31**, **33**, **34**) by tracks of an electrically conductive plastic material.

* * * * *